



2019-2050 BAY AREA SEAPORT FORECAST: COMMISSION BRIEFING

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SF BAY CONSERVATION AND DEVELOPMENT COMMISSION

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PURPOSE & APPROACH

Purpose: To provide an objective basis for BCDC seaport planning and evaluation of proposed amendments

Forecast cargo through 2050 using 2018 base year volumes

- Forecasts based on economic trade drivers and relevant trends
- Limited reliance on recent trade volumes

Separate forecasts for each cargo type and flow

- Containerized: International/domestic, Import/export, Loaded/empty – 8 categories
- Ro-Ro: Imports, Exports – 2 categories
- Dry Bulk: 3 import and 3 export groups – 6 categories

Three forecast scenarios for each flow

- Moderate/Base forecast – what we projected and expect
- Slow/Low – Alternate assumptions yielding slower growth
- Strong/High – Alternate assumptions yielding stronger growth

Forecast capacity through 2050 using industry norms

- Forecast based on current practices and industry trends

Container capacity based on available productivity benchmarks

- Assumes substantial productivity increase over 30 year
- Allows for typical peaking

Ro-Ro capacity based on industry planning standards

- Increased throughput for exports
- Potential impact of larger vehicles

Dry bulk capacity based on existing Bay Area norms

- Allows for peak terminal throughput



Comparison of expected cargo growth, seaport capacity, and long-term seaport land requirements

CURRENT 2019 BAY AREA CARGO FLOWS

Relevant Cargo Types

- Containerized cargo
- Roll-on/Roll-off (Ro-Ro) cargo (formerly “neo-bulk”)
- Dry bulk cargo

Other cargo types

- Non-petroleum liquid bulk cargo (private)
- Break-bulk cargo (not currently handled)

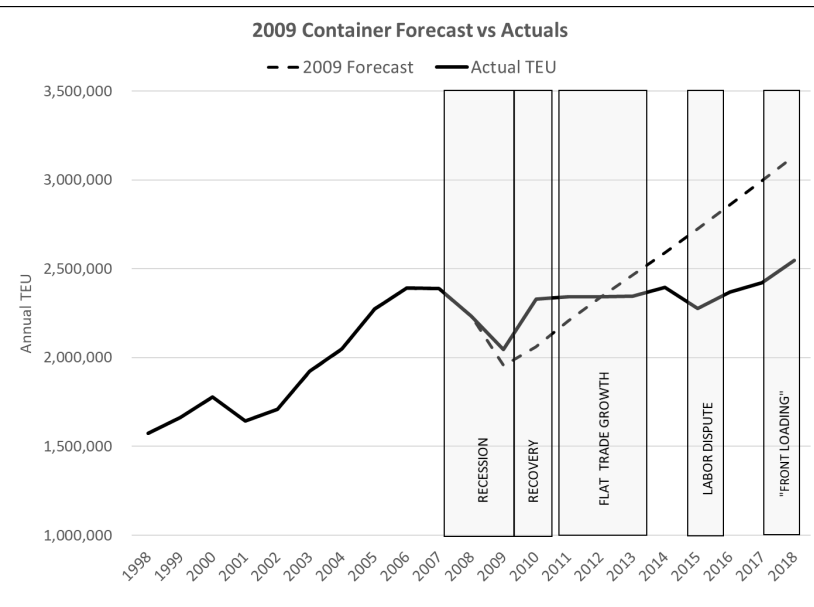
Commodity	Seaport Plan Public Ports					Private Terminals	
	Oakland	Richmond	Benicia	Redwood City	San Francisco	Levin Richmond	Others
Containerized Imports	X						
Containerized Exports	X						
Containerized Domestic IB	X						
Containerized Domestic OB	X						
Import Autos		X	X		X		
Export Autos		X	X		X		
Export Scrap Metal	X ⁽¹⁾			X		X ⁽²⁾	
Import Veg Oils		X					
Import Chemicals							X
Import Gypsum				X			X
Import Cement				X	X		
Export Pet Coke			X			X	
Export Coal						X	
Import Sand & Gravel				X	X		X
Harvested Bay Sand				X	X		
Import Slag				X			
Import Bauxite				X			
(1) Schnitzer Steel (2) From SIMS Richmond							

Exhibit 15, p. 15

PAST FORECASTS: TIMING IS EVERYTHING

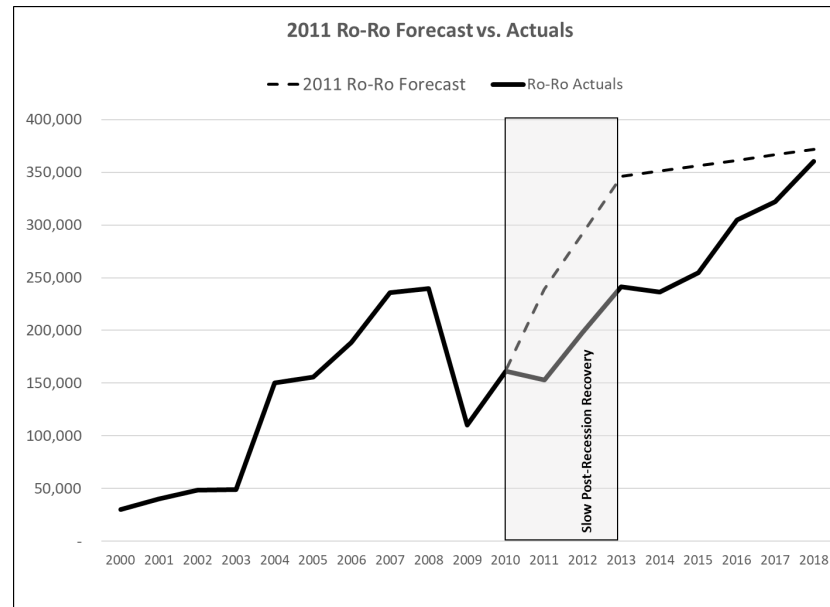
2009 Container Forecast

- 5.3% CAGR 2009-2018 forecast vs 2.2% actual
- Delayed recession recovery
- 2014-15 slow-down
- Pre-COVID return to trend at 5.2%



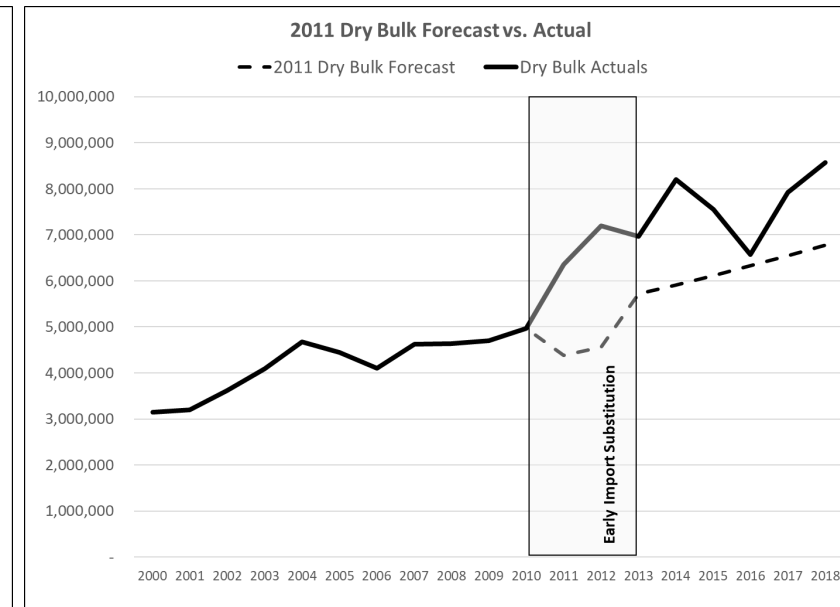
2011 Ro-Ro Forecast

- 15.0% CAGR 2009-2018 forecast vs 14.8% actual
- Delayed recession recovery
- New Tesla Exports
- 2018 volume 3.0% below forecast



2011 Dry Bulk Forecast

- 4.4% CAGR 2009-2018 forecast vs 5.7% actual
- Early import substitution
- 2016 export coal drop
- 2018 volume 27% above forecast

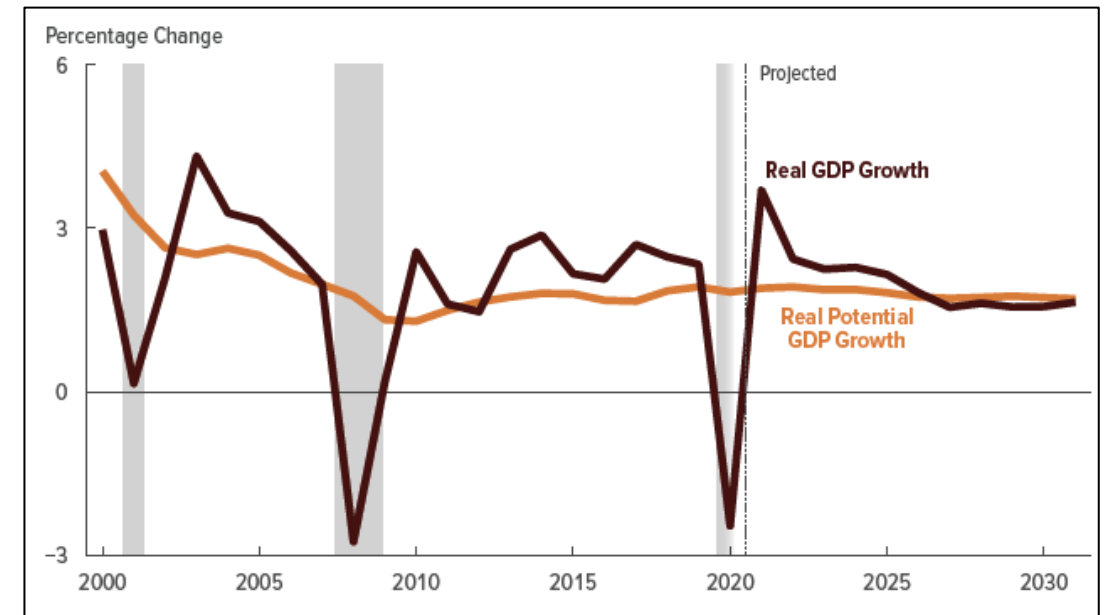


ECONOMIC & DEMOGRAPHIC TRADE DRIVERS

Bay Area seaport activity will be determined by national and regional population and economic activity, and the demand for regional exports.

Reviewed economic forecasts suggest:

- Slower California growth through 2025 relative to previous boom years
- Bay Area employment increasing through 2040
- Long-term population growth in Central and Northern California
- Return to trend after disruptions
- Long-term growth at around 2%



Congressional Budget Office 2/21/22

COVID-19 PANDEMIC IMPACTS

Containerized

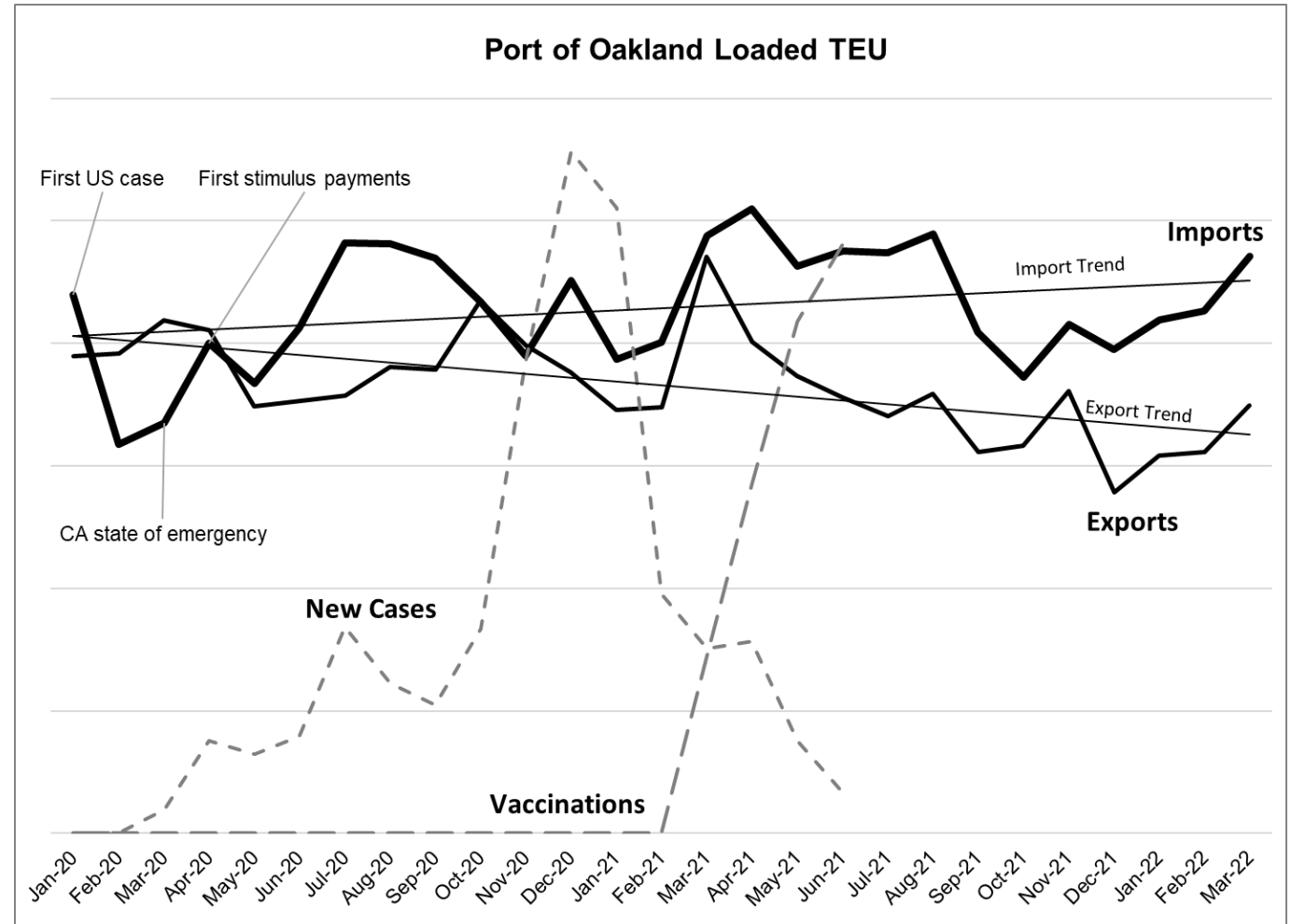
- Import surge and export drop
- Congestion at LALB & Oakland led to vessel bypass
- Some Oakland cargo moved through LALB

Ro-Ro

- Worldwide disruption of vehicle production
- Tesla export disruption
- Shortages of import autos and reduced Ro-Ro volume

Dry Bulk

- Less disrupted than other cargo types
- Impacts are commodity and company-specific



CONTAINERIZED CARGO FORECAST

Port of Oakland only

International Imports and Exports

- Loaded volume forecasts driven by separate econometric models incorporating Moody's Analytics forecasts
- Additional import TEU over three-year periods due to introduction of "first-call" vessels
- Empty volume growth tied to loaded volume growth rates

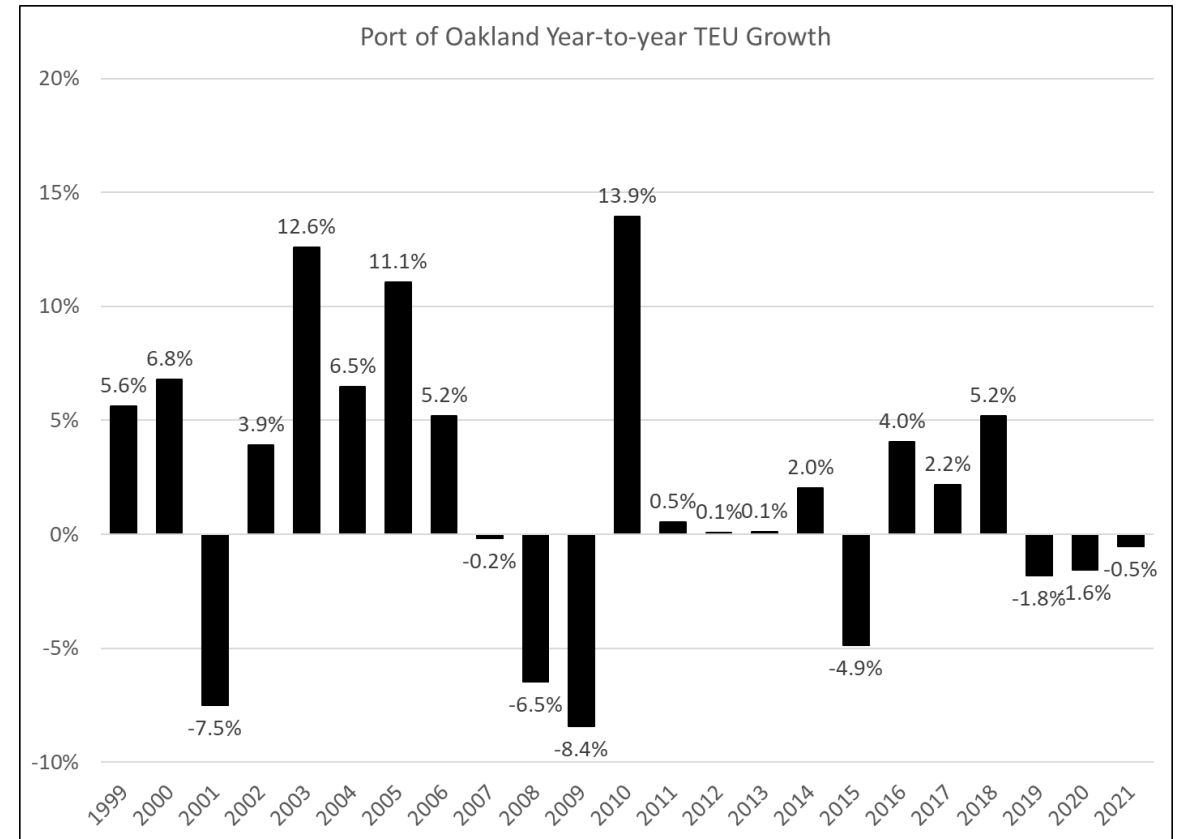
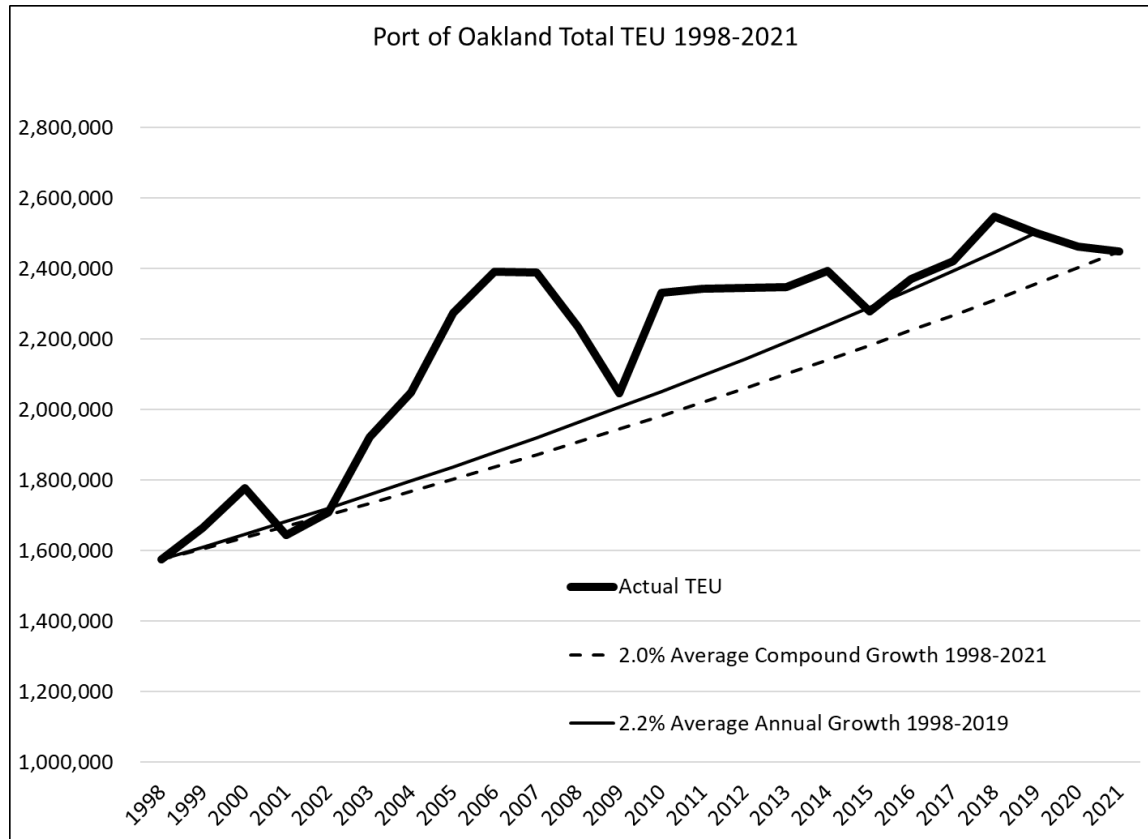
Domestic

- Declining volumes required different approach: assigned growth rate and market shares for loaded volume
- Empty volumes based on historical rates



CONTAINER CARGO HISTORY

- 20-year growth averaging 2.2%
- No “normal” years: short term growth varies widely from long-term trend



TOTAL TEU FORECAST

Moderate Growth Scenario

- Long-term growth at 1.9%
- First call vessels in 2022-2024
- 2018-2050 growth at 2.2%
- 5.2 million TEU by 2050

Slow Growth Scenario

- No first call vessels
- Total TEU 1.3% CAGR
- 3.9 million TEU by 2050

Strong Growth Scenario

- Two first call vessel introductions
- Total TEU 3.2% CAGR
- 7.0 million TEU by 2050

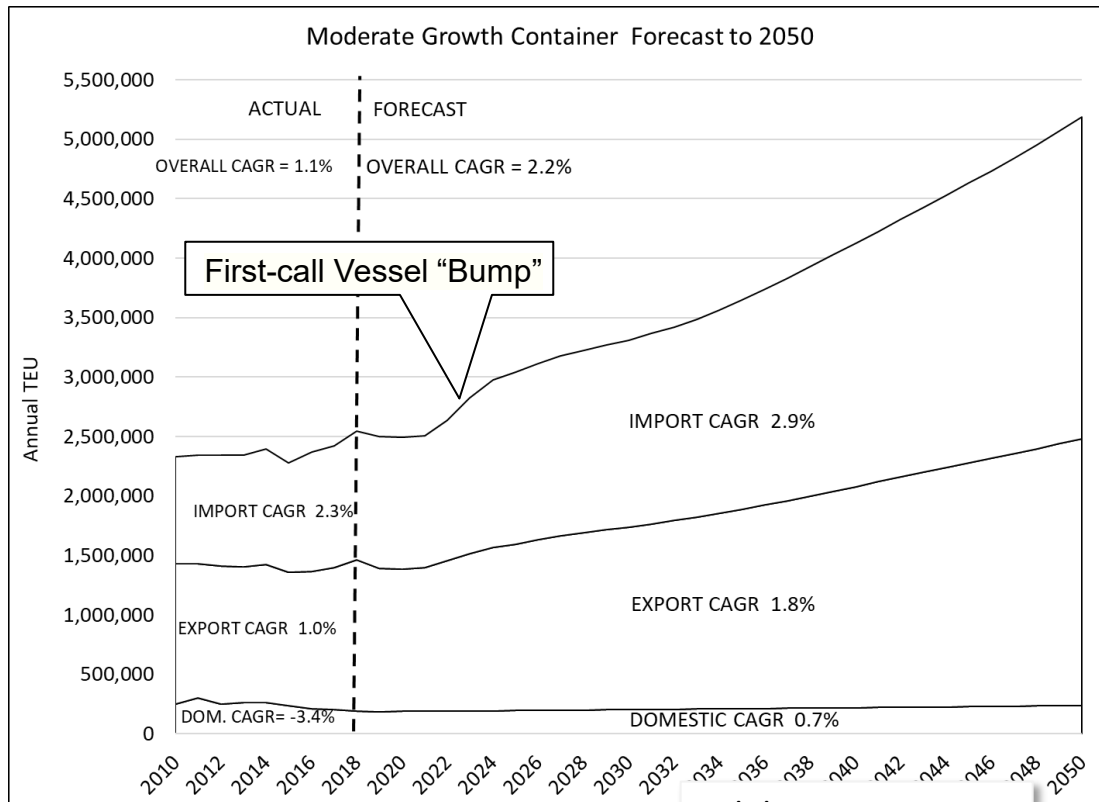


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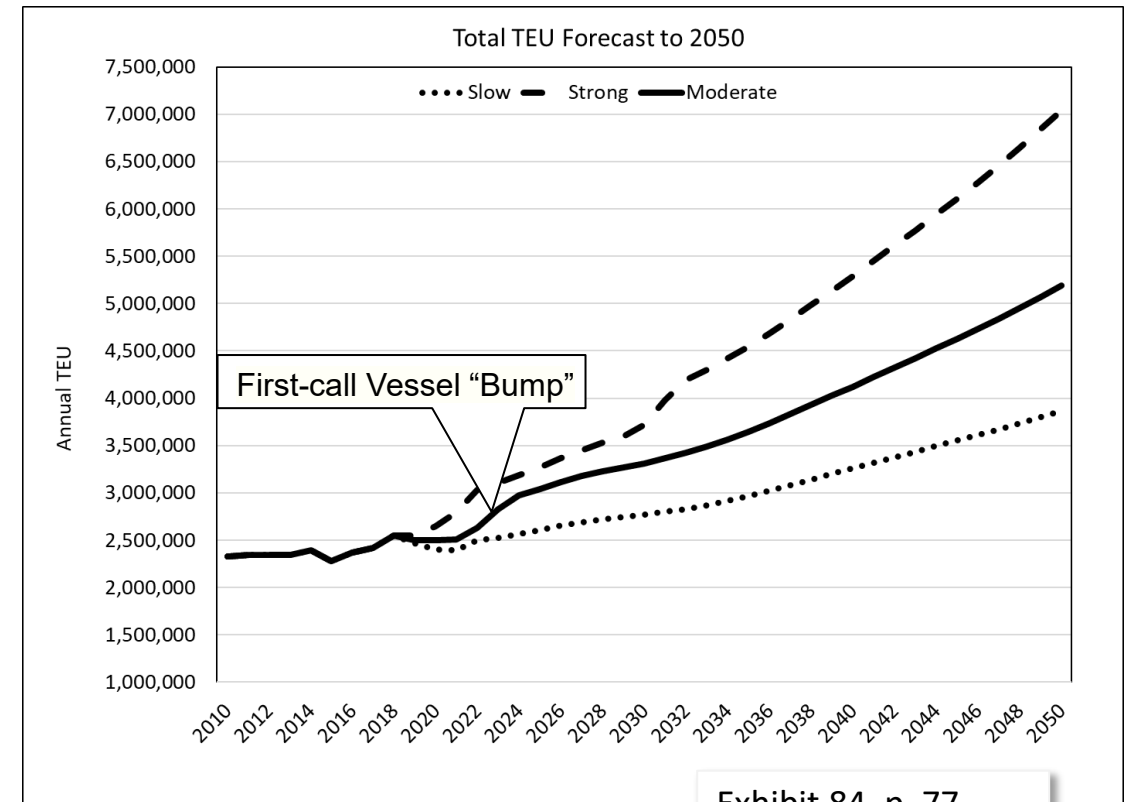
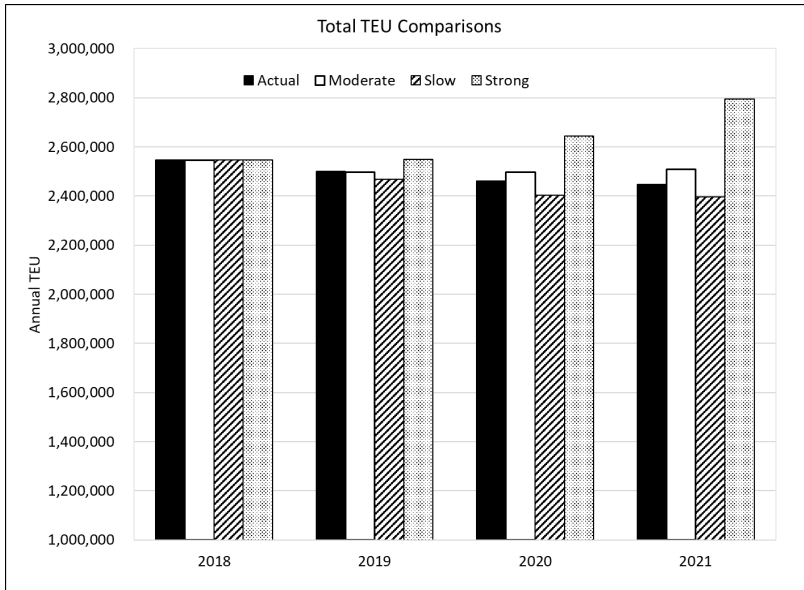


Exhibit 84, p. 77

ACTUAL TEU VS. FORECAST: PANDEMIC DISRUPTION

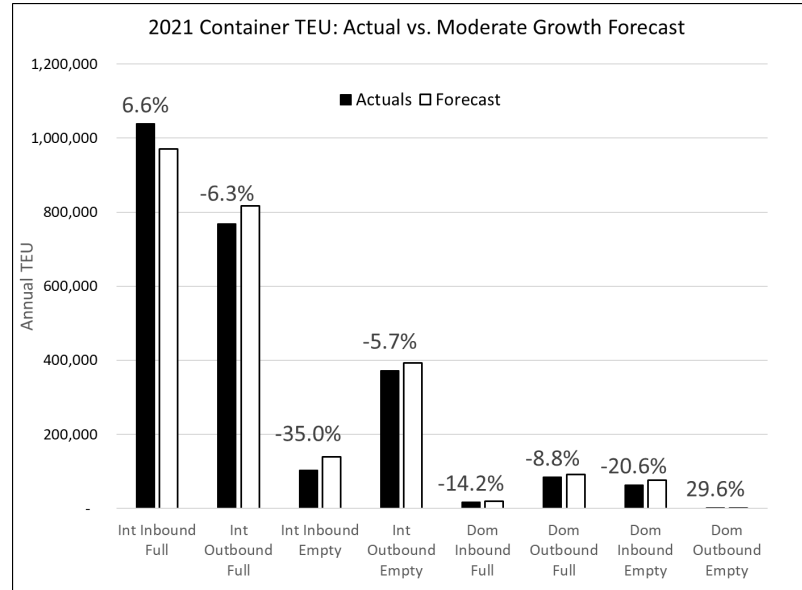
Actual TEU vs. Moderate Forecast

- 0.1% above in 2019
- 1.4% below in 2020.
- 2.4% below in 2021.



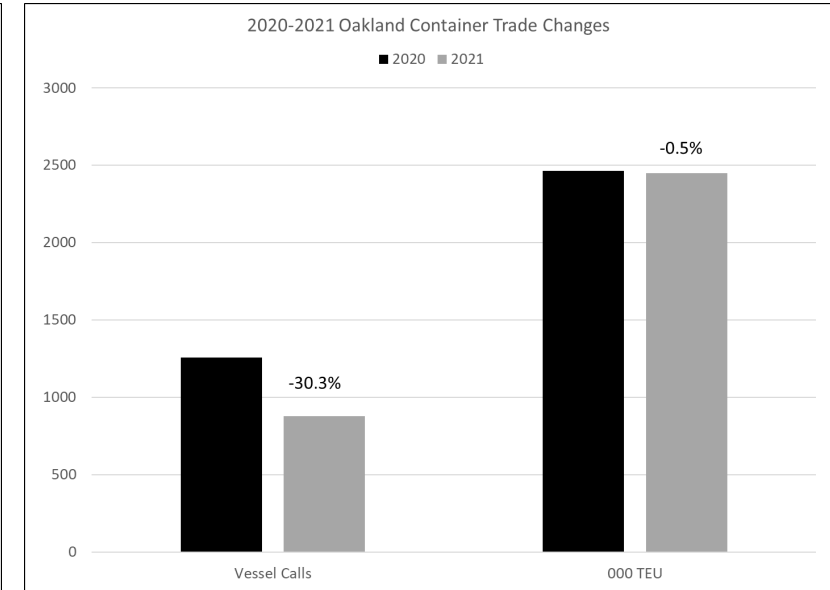
Import surge vs. export decline

- Full imports 6.6% above forecast
- Full exports 6.3% below forecast.
- Inbound empties 35.0% below forecast.



2020-2021 congestion-related loss of vessel calls

- Container vessel calls dropped by 30.3% .
- TEU volume dropped by 0.5%.



OAKLAND CONTAINER TERMINALS

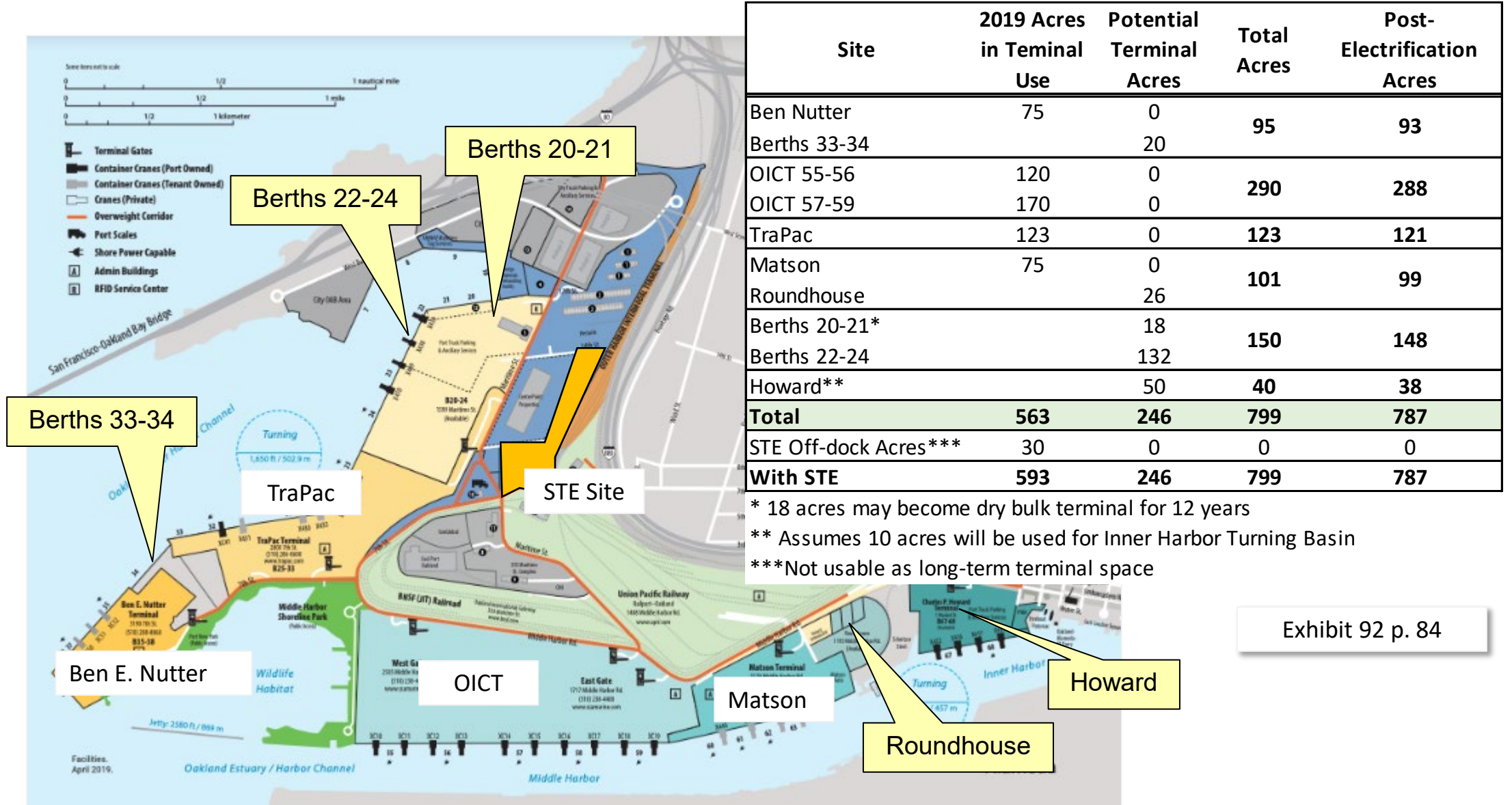


Exhibit 92 p. 84

CONTAINER CARGO GROWTH VS. TERMINAL CAPACITY

Oakland would be at or near capacity by 2050 with moderate growth and high terminal productivity assumptions.

- High productivity benchmark assume 67% average productivity increase by 2050.
- Without Howard Terminal, Oakland would be at 98% of capacity by 2050.
- If both Howard and Berths 20-21 were withdrawn from container cargo use, the Port would be at full capacity by 2050.

Terminal Land Available	2050 Acres Available*	2050 Capacity Utilization with Moderate Growth	2050 Capacity Utilization with Slow Growth	2050 Capacity Utilization with Strong Growth
All Potential Terminal Acres	787	93%	69%	126%
Terminal Acres w/o Howard	749	97%	73%	132%
Terminal Acres w/o Berths 20-21	769	95%	71%	129%
Terminal Acres w/o Howard or B 20-21	731	100%	74%	135%

* Post-electrification

ANCILLARY SERVICE NEEDS

There will likely be adequate space within Oakland Port complex for ancillary services to support projected cargo growth in all three scenarios

- 2050 needs range from 167 acres with Slow Growth to 269 with Strong Growth
- Additional space on City-owned and Union Pacific sites
- Early 2019: 314 acres in use, under development, or available



Acres Required	Truck Services	Overnight Truck Parking	Short-Term Truck Parking	Heavy Cargo Transloading	Reefer Depots	Total
Moderate Growth	8	30	3	109	59	209
Slow Growth	8	28	3	82	45	167
Strong Growth	8	30	4	147	80	269
Acres in Ancillary Use and Available	Seaport Logistics Complex	555 Maritime St Complex	Outer Harbor	City of Oakland	Union Pacific	Total
As of Early 2019	149	78	13	63	11	314

Exhibit 154, p. 138

RO-RO CARGO FORECAST

Ports of Benicia, Richmond, San Francisco

Imports:

- Moderate
 - 2019-2021: Vehicle sales decrease: slowing economy + trade disputes
 - 2022-2025: Vehicle sales increase: economy rebounds
 - 2026-2035: Vehicle sales increase: slightly faster than population
 - 2036-2050: Vehicle sales increase: slower, in line with population
- Slow Growth
 - Vehicle sales under-perform 2022-2025 forecast and increase with population 2026-2050
- Strong Growth
 - Vehicle sales outperform the 2019-2021 CAR forecast and increase faster than population 2026-2050

Exports – electric vehicle exports (Tesla or ?)

- Moderate Growth: weekly vessel call, tapering market growth
- Slow Growth: bi-weekly vessel call through 2028, then tri-weekly
- Strong Growth: twice-weekly vessel call from 2022 onward



2050 BAY AREA RO-RO VEHICLE COUNT FORECAST

Moderate Growth Scenario

- 1.3% CAGR
- 719,000 vehicles by 2050

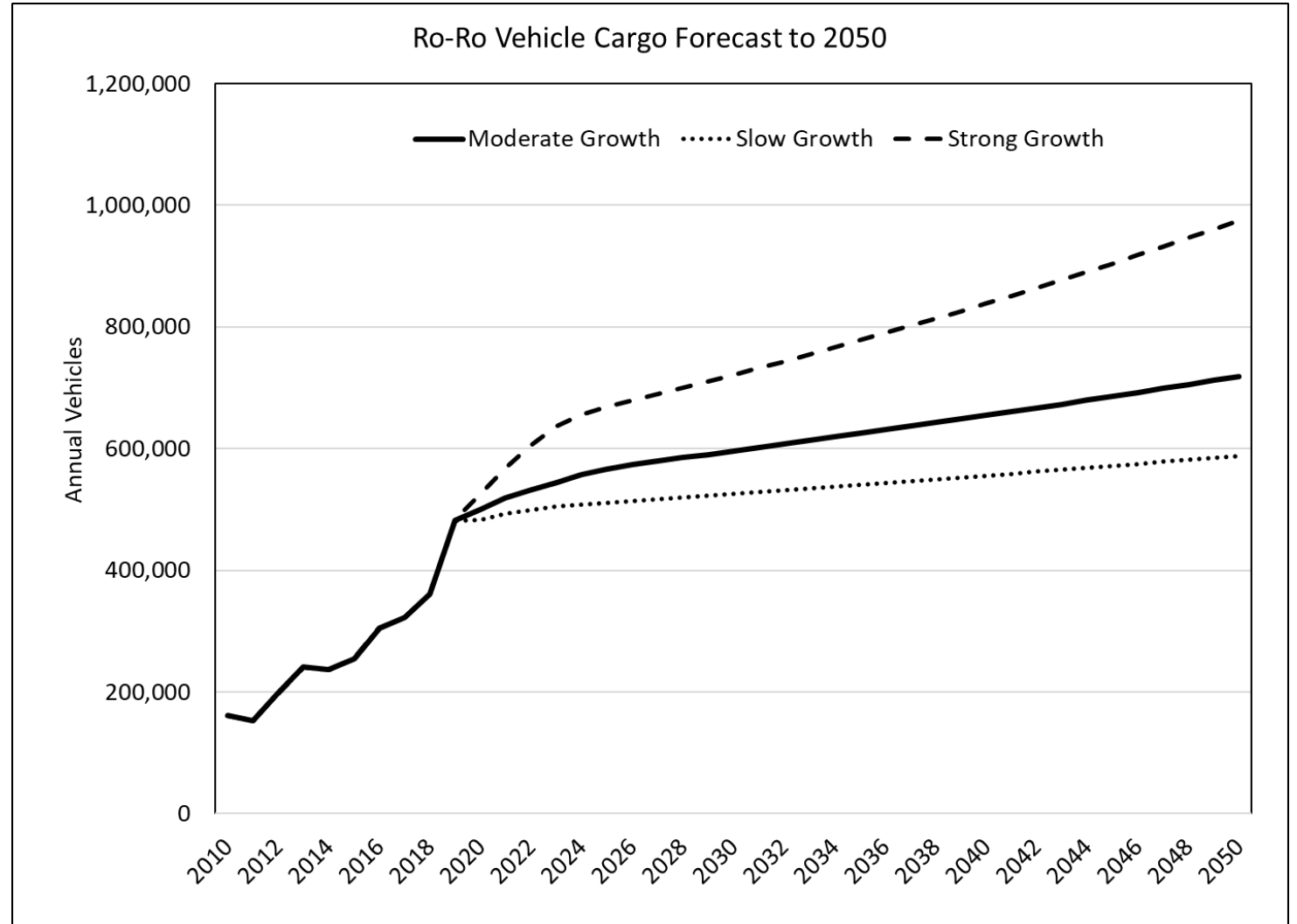
Slow Growth Scenario

- 0.6% CAGR
- 588,000 vehicles by 2050

Strong Growth

- 2.3% CAGR
- 975,000 vehicles by 2050

Exhibit 158, p. 152



RO-RO CARGO GROWTH VS. TERMINAL CAPACITY

With Moderate Growth and expected Base Case productivity improvements, the Bay Area will need **160 additional acres** of Ro-Ro terminal space for 719,000 annual vehicles by 2050.

SF Pier 96, Richmond T-3, and Howard Terminal together could provide **127 acres**.

Terminal	Acres	Low Capacity	Base Case Capacity	High Capacity
Weighted Annual Units per Acre		1,444	1,976	2,903
Existing	215	310,465	424,875	624,178
Benicia	75	108,302	148,212	217,737
Richmond Port Potrero	80	115,522	158,093	232,252
SF Pier 80	60	86,641	118,570	174,189
Potential	127	183,391	250,972	368,701
SF Pier 96 & Other	67	96,750	132,403	194,511
Richmond T-3	20	28,880	39,523	58,063
Oakland Howard Terminal*	40	57,761	79,046	116,126
Total	342	493,856	675,847	992,879

*Assumes turning basin widening

Exhibit 166, p. 158

Combined Scenarios	2050 Vehicles	CAGR	Existing Acres	New Acres	Total Acres
Moderate Growth	718,863	2.2%			
Base Productivity Acres	375		215	160	377
Slow Growth	587,949	1.5%			
Base Productivity Acres	313		215	98	377
Strong Growth	974,850	3.2%			
Base Productivity Acres	496		215	281	377

Exhibit 165, p. 157

DRY BULK CARGO FORECAST

Bay Area ports handle a variety of dry bulk cargo:

- Import sand and gravel (aggregates) at Redwood City and San Francisco
- Harvested bay sand at San Francisco
- Import bauxite and slag at Redwood City
- Import gypsum at Richmond and Redwood City
- Export scrap metal at Redwood City, Richmond, and Schnitzer Steel in Oakland Harbor
- Export petroleum coke at Benicia and Levin Richmond Terminal
- Export coal at Levin Richmond Terminal

Reported shortfall in permitted sand & gravel reserves implies import substitution, while long-term supply fluctuates

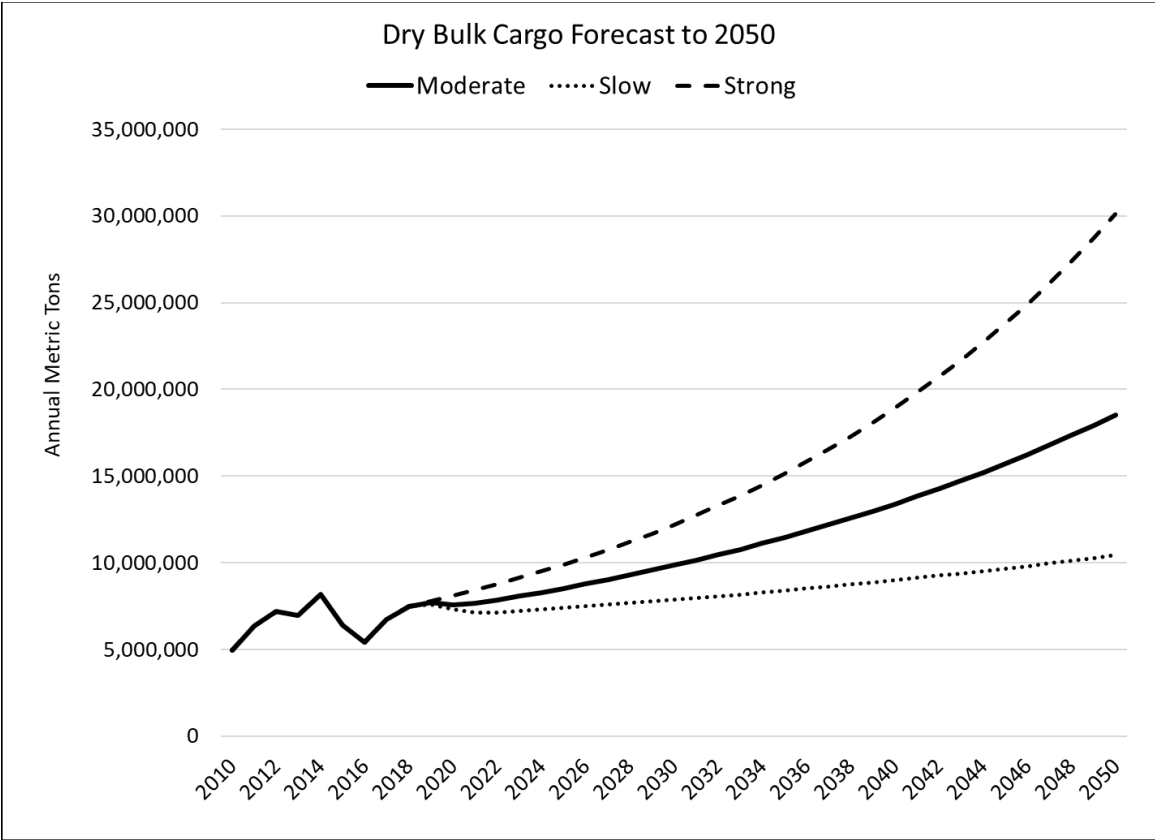
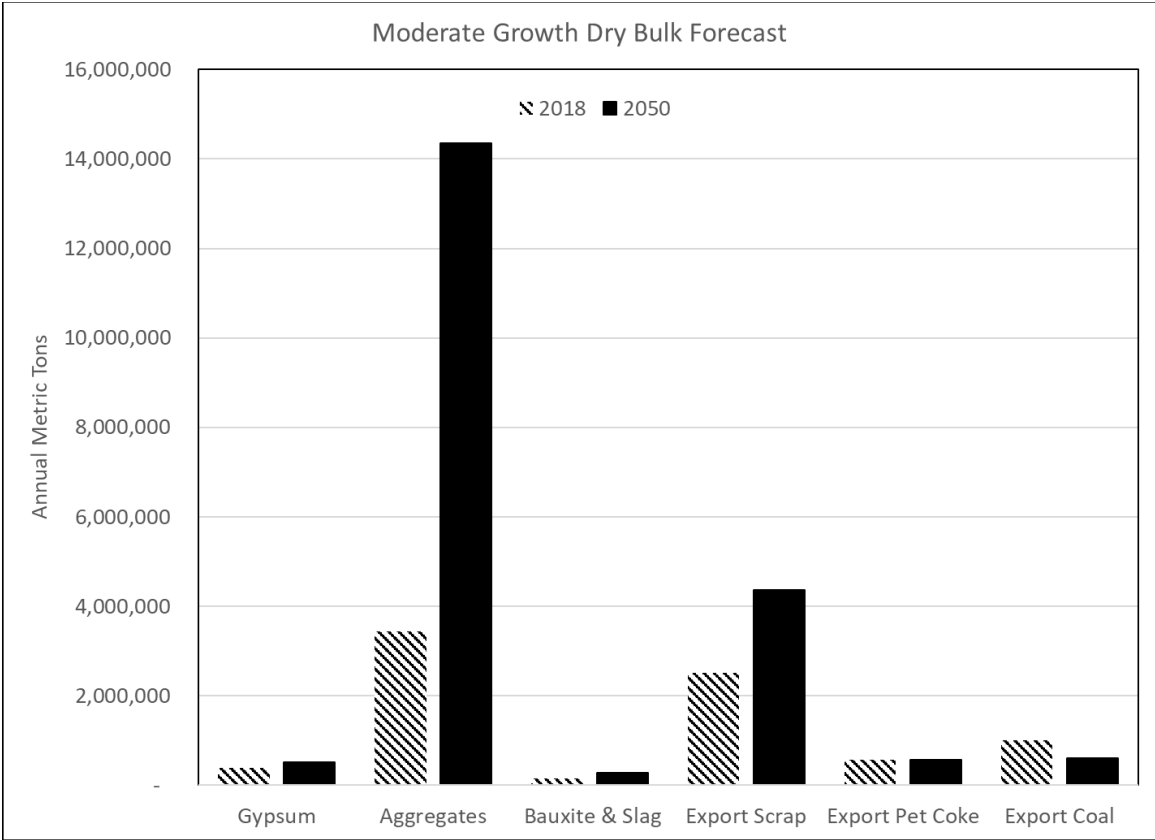
- 2018 - estimated that imported sand & gravel met 8.1% of demand
- 2050 - share of imported sand & gravel projected to increase to:
 - Moderate Growth: 30%
 - Slow Growth: 15%
 - Strong Growth: 50%



2050 BAY AREA DRY BULK FORECAST

Major sources of growth are:

- Imported aggregates (sand & gravel) due to import substitution
- Exported scrap metal



DRY BULK CARGO GROWTH VS. TERMINAL CAPACITY

Moderate growth scenario requires 12 additional acres by 2050.

- Increased productivity based on a range of Bay Area benchmarks, including recent peaks.
- Terminal operators will likely increase throughput on existing terminal space to keep pace with growth as long as possible.

Factor	Existing	Moderate Growth	Slow Growth	Strong Growth
Annual Metric Tons	7,497,526	18,540,459	10,427,307	30,088,971
Tonnage increase	na	131%	35%	265%
Metric Tons/Acre	49,358	113,379	68,646	146,295
Increase over 2018		130%	39%	196%
Acres	152	164	152	206
Additional Acres		12	-	54

ESTIMATED SEAPORT ACREAGE REQUIREMENTS

With moderate cargo growth and expected terminal productivity, the Bay Area will need about 308 acres more active terminal space by 2050. (338 acres if the STE site is used for ancillary services.)

- With slow cargo growth the Bay Area will need about **98 more acres** by 2050.
- With strong cargo growth, the Bay Area will need about **731 more acres**.

Forecast Scenario	Container Terminal Acres			Ro-Ro Cargo Terminal Acres			Dry Bulk Terminal Acres			Combined Terminal Acres		
	Existing*	2050**	Additonal	Existing	2050***	Additonal	Existing	2050***	Additonal	Existing	2050	Additonal
Moderate Growth	593	729	136	215	375	160	152	164	12	960	1,268	308
Moderate Growth w/o STE Site	563	729	166	215	375	160	152	164	12	930	1,268	338
Slow Growth	593	543	-	215	313	98	152	152	-	960	1,008	98
Strong Growth	593	990	397	215	496	281	152	206	54	960	1,691	731

* In-use Acreage at Port of Oakland

** At high productivity Phase VI

***Under base productivity assumptions

Exhibit 208, p. 194

AVAILABLE PORT SITES



BAY AREA SEAPORT EXPANSION SITES

323 acres of available terminal land identified by ports:

- SF 96 partly in non-cargo use
- Oakland Berths 20-21, proposed for dry bulk
- Oakland Berths 22-24 & 33-34, expected container use
- Oakland Roundhouse, potential expansion of Matson terminal
- Oakland Howard at 38 acres post-IHTB
- Richmond T-3, formerly in transloading use

308 acres required with moderate growth and anticipated productivity improvements:

- 338 acres without the STE site
- 98 acres for slow growth
- 731 acres for strong growth

Site	Acres	Potential Use		
		Container	Ro-Ro	Dry Bulk
SF Pier 96 & Other	67		X	X
Oakland Berths 20-21	18	X		X
Oakland Berths 22-24	132	X		
Oakland Berths 33-34	20	X		
Oakland Roundhouse	26	X		
Oakland Howard*	38	X	X	X
Redwood City**	2			X
Richmond Terminal 3	20		X	X
Available Acres	323	178-234	0-127	2-145
Moderate Growth Needs	308	136	160	12
w/o 30 acre STE Site	338	166	160	12
Slow Growth Needs	98	0	98	0
Strong Growth Needs	731	397	281	54

* Post turning basin expansion: 38 acres container, 40 acres Ro-Ro or dry bulk

** Proposed addition

Exhibit 209, p. 195

2050 FORECAST & CAPACITY FINDINGS

With anticipated moderate growth and productivity improvements, overall Bay Area seaport capacity will be very tight by 2050.

- Oakland could likely handle moderate container cargo growth through 2050 without Howard Terminal or Berths 20-21, but with little or no room for future growth.
- Available Bay Area expansion sites are likely insufficient for anticipated moderate Ro-Ro cargo growth, even with expected productivity improvements.
- Dry cargo capacity needs can likely be met, but may conflict with use of SF Pier 96, Oakland's Berth 20-21, or Howard Terminal for Ro-Ro or container cargo.

QUESTIONS AND COMMENTS?